



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of

KOMETANI et al

Atty. Ref.: 380-45; Confirmation No. 3708

Appl. No. 10/724,608

TC/A.U. 1711

Filed: December 2, 2003

Examiner: Sergeant

For: CATALYST FOR PRODUCTION OF A TWO COMPONENT POLYURETHANE  
SEALANT

\* \* \* \* \*

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**SUPPLEMENTAL EVIDENTIARY DECLARATION UNDER 37 CFR §1.132**

I, Hiroyuki Kometani, an inventor in the above-identified application, do hereby declare:

1. That I am the same person who provided evidence in this application in my declaration made June 6, 2006.
2. That I continue to be employed by Tosoh Corporation of Tokyo, Japan, the assignee of this application.
3. That I have reviewed my declaration of June 6, 2006 and now provide my own observations and comments on the six formulations given in the following table explaining the significance of the results obtained, and that this information is the same as the detailed explanation submitted herein on October 30, 2007.

4.

	Polyether polyol	Polyester polyol	Polymer polyol	Flame retardant polyol
MDI	Formulation B			
TDI	Formulation C			
MDI base prepolymer	Formulation A	Formulation E	Formulation F	Formulation G
TDI base prepolymer	Formulation D			

Formulation:		
A	MDI base prepolymer	Polyether polyol
B	MDI	Polyether polyol
C	TDI	Polyether polyol
D	TDI base prepolymer	Polyether polyol
E	MDI base prepolymer	Polyester polyol
F	MDI base prepolymer	Polymer polyol
G	MDI base prepolymer	Flame retardant polyol

1. Formulation A (Table 3 to 5 in the application)

As is evident from Example 7 to 12 and FIGS. 1 to 6, when the catalyst of the present invention is employed, it is possible to satisfy both the desired long pot life and the rapid viscosity increase.

As is evident from Comparative Example 1 and FIG. 7, even when the acid of the present invention is used, if the ratio of the amine/the acid exceeds 1.3 by molar ratio, the rapid increase of the viscosity tends to be lost.

As is evident from Comparative Example 2 and FIG. 8, and from Comparative Example 6 and FIG. 12, when a catalyst having DBU blocked with formic acid or phenol, is used, it tends to be difficult to obtain a long pot life, although the rapid viscosity increase can be attained. Further, as is evident from Comparative Example 3 and FIG. 9, when 2-ethylhexanoic acid is used, as the acid, the viscosity increase is not rapid, such being not practical. Namely, with an aliphatic monocarboxylic acid having no unsaturated bond in its molecule, it is impossible to satisfy both the long pot life and the rapid viscosity increase.

As is evident from Comparative Example 4 and FIG. 10, when p-toluenesulfonic acid is used as the acid, the viscosity increase hardly takes place even when a large amount of the catalyst is used, whereby no rapid increase of the viscosity is observed. Further, as is evident from Comparative Example 5 and FIG. 11, also in a case where a dicarboxylic acid is used instead of a monocarboxylic acid, the viscosity increase is slow and is not practical, even if the acid has an unsaturated bond.

As is evident from Comparative Example 8 and FIG. 14, when a lead catalyst is employed as a substitute for a mercury catalyst, the catalytic activity is very strong, but the viscosity increase is not rapid, whereby it is difficult to obtain the required pot life and the rapid viscosity increase.

As is evident from the foregoing results, by using the catalyst of the present invention, it is possible to satisfy both the long pot life and the rapid viscosity increase, in the same manner as is the mercury catalyst which used to be employed. Further, it should be readily understood that even if the bicyclic amidine catalyst (DBU, DBN or DBD) is blocked with an acid other than the acid of the present invention, the long pot life can not be obtained, or the rapid viscosity increase can not be attained.

2. Formulation B (Table 4, 6, 7 in the declaration dated Jun 07, 2006)

As is evident from Example 13 to 16, when the catalyst of the present invention is employed, it is possible to satisfy both the desired long pot life and the rapid viscosity increase.

As is evident from Comparative Example 9, when a catalyst having DBU blocked with formic acid is used, it tends to be difficult to obtain a long pot life, although the rapid viscosity increase can be attained. Further, as is evident from Comparative Example 10, when 2-ethylhexanoic acid is used as the acid, the viscosity increase is not rapid, such being not practical. Namely, with an aliphatic monocarboxylic acid having no unsaturated bond in its molecule, it is impossible to satisfy both the long pot life and the rapid viscosity increase.

As is evident from Comparative Example 11, when p-toluenesulfonic acid is used as the acid, the viscosity

increase hardly takes place even when a large amount of the catalyst is used, whereby no rapid increase of the viscosity is observed.

As is evident from Comparative Example 13, when a lead catalyst is employed as a substitute for a mercury catalyst, the catalytic activity is very strong, but the viscosity increase is not rapid, whereby it is difficult to obtain the required pot life and the rapid viscosity increase.

3. Formulation C (Table 8 to 10 in the declaration dated Jun 07, 2006)

As is evident from Example 13 to 16, when the catalyst of the present invention is employed, it is possible to satisfy both the desired long pot life and the rapid viscosity increase.

As is evident from Comparative Example 9, when a catalyst having DBU blocked with formic acid is used, it tends to be difficult to obtain a long pot life, although the rapid viscosity increase can be attained. Further, as is evident from Comparative Example 10, when 2-ethylhexanoic acid is used as the acid, the viscosity increase is not rapid, such being not practical. Namely, with an aliphatic monocarboxylic acid having no unsaturated bond in its molecule, it is impossible to satisfy both the long pot life and the rapid viscosity increase.

As is evident from Comparative Example 11, when p-toluenesulfonic acid is used as the acid, the viscosity increase hardly takes place even when a large amount of the catalyst is used, whereby no rapid increase of the viscosity is observed.

As is evident from Comparative Example 13, when a lead catalyst is employed as a substitute for a mercury catalyst, the catalytic activity is very strong, but the viscosity increase is not rapid, whereby it is difficult to obtain the required pot life and the rapid viscosity increase.

4. Formulation D (Table 11 to 13 in the declaration dated Jun 07, 2006)

As is evident from Example 17 to 20, when the catalyst of the present invention is employed, it is possible to satisfy both the desired long pot life and the rapid viscosity increase.

As is evident from Comparative Example 14, when a catalyst having DBU blocked with formic acid is used, it tends to be difficult to obtain a long pot life, although the rapid viscosity increase can be attained. Further, as is evident from Comparative Example 15, when 2-ethylhexanoic acid is used as the acid, the viscosity increase is not rapid, such being not practical. Namely, with an aliphatic monocarboxylic acid having no unsaturated bond in its molecule, it is impossible to satisfy both the long pot life and the rapid viscosity increase.

As is evident from Comparative Example 16, when p-toluenesulfonic acid is used as the acid, the viscosity increase hardly takes place even when a large amount of the catalyst is used, whereby no rapid increase of the viscosity is observed.

As is evident from Comparative Example 18, when a lead catalyst is employed as a substitute for a mercury catalyst, the catalytic activity is very strong, but the viscosity increase is not rapid, whereby it is difficult to obtain the required pot life and the rapid viscosity increase.

5. Formulation B (Table 14 to 16 in the declaration dated Jun 07, 2006)

As is evident from Example 21 to 24, when the catalyst of the present invention is employed, it is possible to satisfy both the desired long pot life and the rapid viscosity increase.

As is evident from Comparative Example 19, when a catalyst having DBU blocked with formic acid is used, it tends to be difficult to obtain a long pot life, although the rapid viscosity increase can be attained. Further, as is evident from Comparative Example 20, when 2-ethylhexanoic acid is used as the acid, the viscosity increase is not rapid, such being not practical. Namely, with an aliphatic monocarboxylic acid having no unsaturated bond in its molecule, it is impossible to satisfy both the long pot life and the rapid viscosity increase.

As is evident from Comparative Example 21, when p-toluenesulfonic acid is used as the acid, the viscosity increase hardly takes place even when a large amount of the catalyst is used, whereby no rapid increase of the viscosity is observed.

As is evident from Comparative Example 21, when a lead catalyst is employed as a substitute for a mercury catalyst, the catalytic activity is very strong, but the viscosity increase is not rapid, whereby it is difficult to obtain the required pot life and the rapid viscosity increase.

6. Formulation F (Table 17 to 19 in the declaration dated Jun 07, 2006)

As is evident from Example 25 to 28, when the catalyst of the present invention is employed, it is possible to satisfy both the desired long pot life and the rapid viscosity increase.

As is evident from Comparative Example 24, when a catalyst having DBU blocked with formic acid is used, it tends to be difficult to obtain a long pot life, although the rapid viscosity increase can be attained. Further, as is evident from Comparative Example 25, when 2-ethylhexanoic acid is used as the acid, the viscosity increase is not rapid, such being not practical. Namely, with an aliphatic monocarboxylic acid having no unsaturated bond in its molecule, it is impossible to satisfy both the long pot life and the rapid viscosity increase.

As is evident from Comparative Example 26, when p-toluenesulfonic acid is used as the acid, the viscosity increase hardly takes place even when a large amount of the catalyst is used, whereby no rapid increase of the viscosity is observed.

As is evident from Comparative Example 28, when a lead catalyst is employed as a substitute for a mercury catalyst, the catalytic activity is very strong, but the viscosity increase is not rapid, whereby it is difficult to obtain the required pot life and the rapid viscosity increase.

7. Formulation G (Table 20 to 22 in the declaration dated Jun 07, 2006)

As is evident from Example 29 to 32, when the catalyst of the present invention is employed, it is possible to satisfy both the desired long pot life and the rapid viscosity increase.

As is evident from Comparative Example 29, when a catalyst having DBU blocked with formic acid is used, it tends to be difficult to obtain a long pot life, although the

rapid viscosity increase can be attained. Further, as is evident from Comparative Example 30, when 2-ethylhexanoic acid is used as the acid, the viscosity increase is not rapid, such being not practical. Namely, with an aliphatic monocarboxylic acid having no unsaturated bond in its molecule, it is impossible to satisfy both the long pot life and the rapid viscosity increase.

As is evident from Comparative Example 31, when p-toluenesulfonic acid is used as the acid, the viscosity increase hardly takes place even when a large amount of the catalyst is used, whereby no rapid increase of the viscosity is observed.

As is evident from Comparative Example 33, when a lead catalyst is employed as a substitute for a mercury catalyst, the catalytic activity is very strong, but the viscosity increase is not rapid, whereby it is difficult to obtain the required pot life and the rapid viscosity increase.

As is evident from the foregoing results, by reacting a polyol with an organic polyisocyanate and/or an isocyanate prepolymer selected from the group consisting of MDI, TDI, MDI prepolymer and TDI prepolymer in the presence of the catalyst of the present invention, it is possible to satisfy both the long pot life and the rapid viscosity increase, in the same manner as is the mercury catalyst which used to be employed. Further, it should be readily understood that even if the bicyclic amidine catalyst is blocked with an acid other than the acid of the present invention, the long pot life can not be obtained, or the rapid viscosity increase can not be attained.

5. I declare further that all statements made herein of my/our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Hiroyuki Kometani  
Hiroyuki Kometani

Date: 29 NOV. 2007